



# UNITED STATES PATENT AND TRADEMARK OFFICE

*Handwritten signature*

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/721,072

11/26/2003

Stephen R. Forrest

10020/30501

7794

23838

7590

06/16/2005

KENYON & KENYON  
1500 K STREET NW  
SUITE 700  
WASHINGTON, DC 20005

EXAMINER

LANDAU, MATTHEW C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/721,072	<b>Applicant(s)</b> FORREST ET AL.	
	<b>Examiner</b> Matthew Landau	<b>Art Unit</b> 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 15-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7, 8, 11-14, 22 and 23 is/are rejected.
- 7) ☒ Claim(s) 4-6, 9 and 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 May 2005 and 26 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/26/04, 7/26/04</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Election/Restrictions***

Applicant's election with traverse of Group I (claims 1-16) in the reply filed on 2/16/2005 and Species I (claims 1-14, 22, and 23) in the reply filed on 5/23/2005 is acknowledged. Note that at no point did the Examiner withdraw the restriction requirement mailed on 1/28/2005 as suggested by Applicant. The traversal is on the ground(s) that the restriction requirement did not explain how the product can be made by a materially different process. Applicant contends that the adjectives "first" and "second" are general and interchangeable, therefore the alternate process proposed by the Examiner is not materially different. This is not found persuasive. As acknowledged by Applicant, the adjectives "do *not* specify order, but merely specify different materials, i.e., material A and material B". The fact that the adjectives specify different materials is exactly why the proposed process is materially different. In the context of the claim, once the materials have been defined as first and second (A and B), they can no longer be interchanged. Since claim 17 defines a certain order and claim 1 does not, an alternate process will always exist specifying a different order, regardless of which material Applicant chooses to define as the first material. Since the first and second materials are different materials, that process will be materially different.

The requirement is still deemed proper and is therefore made FINAL.

Claims 15-21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention or species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 5/23/2005.

### ***Drawings***

The drawings were received on 5/23/2005. These drawings are acceptable.

### ***Claim Objections***

Claim 22 is objected to because of the following informalities: the limitation “wherein the first organic layer and the second organic layer comprise at least one electronic device” is objected to. It is suggested the limitation be changed to read “wherein the first organic layer and the second organic layer are part of ~~comprise~~ at least one electronic device” (or something similar), since the organic layers themselves do not “comprise” an electronic device. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 8, 11, 14, 22, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Brown et al. (US Pat. 5,629,530, hereinafter Brown).

Regarding claims 1 and 22, Figure 6 of Brown discloses an organic device comprising: a first electrode 21; a second electrode 25; a first organic layer 23 disposed between the first electrode and the second electrode, the first organic layer further comprising: a first organic material (TCNQ), wherein the first organic layer comprises at least 50% molar of the first

Art Unit: 2815

organic material (col. 6, lines 22-24); a second organic material (TTF), wherein the first organic layer comprises less than 50% molar of the second organic material; a second organic layer 22 disposed between the first electrode and the second electrode, the second organic layer further comprising: the second organic material (TCNQ), wherein the second organic layer comprises at least 50% molar of the second organic material (col. 6, lines 17-19); the first organic material, the second organic layer comprises less than 50% molar of the first organic material. Regarding claim 22, as best the examiner can ascertain the claimed invention, Brown further discloses wherein the first organic layer 23 and the second organic layer 22 comprise at least one electronic device.

Regarding claim 2, Brown discloses the first organic layer 23 is an n-type layer (col. 6, lines 22-24), wherein the first organic material (TCNQ) is a host and the second organic material (TTF) is an n-type dopant (i.e., donor) (col. 6, lines 49 and 50); the second organic layer 22 is an p-type layer (col. 6, lines 17-19), wherein the second organic material (TTF) is a host and the first organic material (TCNQ) is a p-type dopant (i.e., acceptor)(col. 6, lines 52 and 53).

Regarding claim 3, Brown discloses the first organic layer 23 consist essentially of the first and second organic materials, and the second organic layer 22 consists essentially of the first and second organic materials (col. 6, lines 17-24).

Regarding claim 8, it is inherent that the first and second organic materials of Brown (TCNQ and TTF) are organic small molecules.

Regarding claim 11, Figure 6 of Brown discloses the first organic layer 23 and the second organic layer 22 are in direct contact with each other.

Regarding claim 14, Figure 6 of Brown discloses the second organic layer 22 is disposed between the first organic layer 23 and the second electrode 21.

Regarding claim 23, Brown discloses the first organic material (TCNQ) is an acceptor molecule in the second organic layer 22 (col. 6, lines 51 and 52).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. ("Low-Voltage Organic...", hereinafter Huang) in view of Brown.

Regarding claims 1, 2, and 7, Figure 1(a) of Huang discloses an organic light-emitting device comprising a first electrode (ITO substrate); a second electrode (Al/LiF layers); a first n-type organic layer (Bphen:Li); a second p-type organic layer (m-MTDATA:F<sub>4</sub>TCNQ layer); and an emissive layer between the n-type layer and the p-type layer. The difference between Huang and the claimed invention is the first organic layer comprises a first organic material, wherein the first organic layer comprises at least 50% molar of the first organic material; and a second organic material, wherein the first organic layer comprises less than 50% molar of the second organic material; and the second organic layer comprising: the second organic material, wherein the second organic layer comprises at least 50% molar of the second organic material; and the first organic material, the second organic layer comprises less than 50% molar of the first organic

Art Unit: 2815

material. Figure 6 of Brown discloses a first organic layer 23 (n-type) disposed between the first electrode and the second electrode, the first organic layer further comprising: a first organic material (TCNQ), wherein the first organic layer comprises at least 50% molar of the first organic material (col. 6, lines 22-24); a second organic material (TTF)(n-type dopant) (col. 6, lines 49 and 50), wherein the first organic layer comprises less than 50% molar of the second organic material; a second organic layer 22 (p-type) disposed between the first electrode and the second electrode, the second organic layer further comprising: the second organic material (TCNQ), wherein the second organic layer comprises at least 50% molar of the second organic material (col. 6, lines 17-19); the first organic material (p-type dopant)(col. 6, lines 52 and 53), wherein the second organic layer comprises less than 50% molar of the first organic material. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Huang by using the first (n-type) and second (p-type) organic layers of Brown for the purpose of simplifying the production process (col. 2, lines 11-31).

Claims 1, 2, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell et al. (US Pat. 6,320,117, hereinafter Campbell) in view of Brown.

Regarding claims 1, 2, and 13, Figure 10 of Campbell discloses a photosensitive device comprising a first electrode 120; a second electrode 930, an n-type semiconductor layer 145; and a p-type semiconductor layer 135. The difference between Campbell and the claimed invention is first and second organic semiconductor layers, wherein both the first and second layers comprise a first and a second organic material, wherein the first layer has at least 50% of the first

Art Unit: 2815

organic material and the second layer has at least 50% of the second organic material. Figure 6 of Brown discloses a first organic layer 23 (n-type) disposed between the first electrode and the second electrode, the first organic layer further comprising: a first organic material (TCNQ), wherein the first organic layer comprises at least 50% molar of the first organic material (col. 6, lines 22-24); a second organic material (TTF)(n-type dopant) (col. 6, lines 49 and 50), wherein the first organic layer comprises less than 50% molar of the second organic material; a second organic layer 22 (p-type) disposed between the first electrode and the second electrode, the second organic layer further comprising: the second organic material (TCNQ), wherein the second organic layer comprises at least 50% molar of the second organic material (col. 6, lines 17-19); the first organic material (p-type dopant)(col. 6, lines 52 and 53), wherein the second organic layer comprises less than 50% molar of the first organic material. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Campbell by using the first (n-type) and second (p-type) organic layers of Brown for the purpose of simplifying the production process (col. 2, lines 11-31).

Regarding claim 11, Figure 10 of Campbell discloses the first layer 145 and the second layer 135 are in direct contact with each other.

Regarding claim 12, Figure 10 of Campbell discloses a device having a pnp region. Therefore, the device can be considered a transistor. Note that whether or not the device operates as a transistor is merely a matter of intended use and does not structurally/patentably distinguish the claimed invention over the prior art.



***Allowable Subject Matter***

Claims 4-6, 9, and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 4, the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including wherein the first organic material is PTCDA, and wherein the second organic material is BTQBT.

Regarding claim 5, the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including wherein the first organic material is F16-CuPc, and wherein the second organic material is BTQBT.

Regarding claim 6, the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including wherein the first organic material is F16-CuPc, and wherein the second organic material is CuPc.

Regarding claims 9 and 10, the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including wherein the electron affinity of the first organic material is within about 0.4 eV of the ionization potential of the second organic material.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

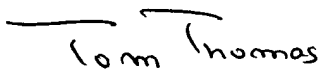
Art Unit: 2815

Foster, R., "Organic Charge-Transfer Complexes" – this reference is cited in Brown et al. (US Pat. 5,629,530). Only the table specifically cited by Brown is provided.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should any questions arise regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
TOM THOMAS  
SUPERVISORY PATENT EXAMINER

Matthew C. Landau  
Examiner

June 7, 2005